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Dinosaur Lake Summer Creel Surveys, Results of the 1988 Program and a Five Year Review (1984 - 1988)

R. Pattenden and G. Ash
April 1993

PWFWCP Report No. 73

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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ABSTRACT

R.L. & L. Environmental Services Ltd. 1993. Dinosaur Lake summer creel surveys, Results of the 1988 Program and a Five Year Review (1984 - 1988). Prepared for B. C. Ministry of Environment, Lands and Parks, Fish and Wildlife Branch. R.L.& L. Rep. No. 370(1F): 26p. + 1 app.

An estimated total of 1599 anglers utilized Dinosaur Lake during the summer creel survey period in 1988. These anglers expended 3496 hours to catch an estimated 997 rainbow trout which represented a catch rate of 0.29 fish/h. Hatchery stock rainbow trout accounted for 48% of the harvest and exhibited similar growth, age and size distributions as wild stock rainbow trout. Local fishermen accounted for most anglers utilizing Dinosaur Lake during 1988.

Rainbow trout was the predominant sportfish captured by anglers on Dinosaur Lake. Creel data between 1984 and 1988 indicated that hatchery stock rainbow trout made a significant contribution to the sport fishery in terms of catch (approximately 50%). Both stocks exhibited good growth rates and similar age and size distributions during each year surveyed. Number of anglers and rainbow trout catch were highest during 1984, the first year Dinosaur Lake was available to recreational anglers. The effort expended by fishermen and their catch then dropped and remained consistently below 1984 levels during the following years (1985 to 1988). Catch rates were relatively constant during all years surveyed, but were low (<0.40 fish/h). Most anglers fishing on Dinosaur Lake resided in the Peace River region (>75%). They rated their fishing success as poor, but enjoyed their overall angling experience.

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1.0 INTRODUCTION

Dinosaur Lake, the reservoir formed by the Peace Canyon Hydroelectric Generation Project on the Peace River (Figure 1), was first opened to sport fishing on 1 July 1984. In April 1980, B.C. Environment and B.C. Hydro signed a memorandum of agreement concerning this project. As part of fisheries compensation, this agreement called for construction of a pilot hatchery which would annually produce 50 000 rainbow trout yearlings for release into Dinosaur Lake. It also was agreed that evaluation of the stocking program would include an annual creel survey of the Dinosaur Lake sport fishery. As such, summer creel surveys were conducted annually from 1984 to 1988.

R.L. & L. Environmental Services Ltd. was contracted to compile the creel survey data provided by B.C. Environment. This information has been used to produce a comprehensive summary of the 1988 data, and to review the trends in the annual creel data. This report summarizes these findings.

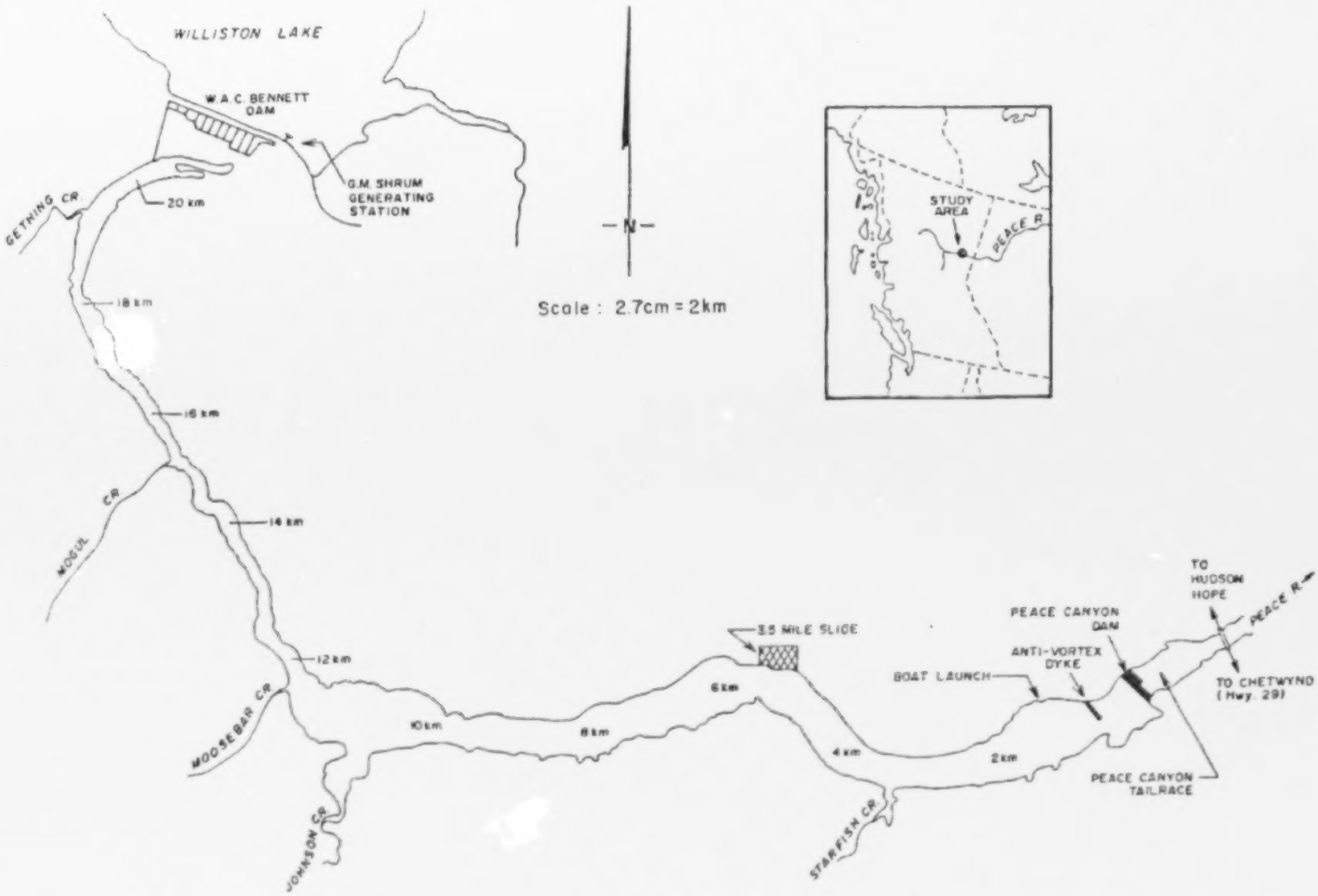

Figure 1 Map and location of Dinosaur Lake.

Source: B.C. Ministry of Environment and Parks, 1986

2.0 METHODS

Data were analyzed using in-house computer facilities (IBM compatible 386-40 MHz with 120MB hard drive). Software packages utilized included Lotus 123© for data manipulation, SPSS-PC© for data analyses, Lotus Freelance© for figure construction, and WordPerfect© V5.2 for report production. Procedures for data analyses were dependent on the tasks required, but all statistical analyses followed Sokal and Rohlf (1981), and significance was accepted at $P<0.05$.

2.1 CREEL CENSUSES 1984-1988

Creel censuses were conducted by B.C. Environment at Dinosaur Lake during summers of 1984 to 1988. In general, these censuses followed a similar sampling regime. There were four sampling strata: weekday mornings and evenings, and weekend or holiday mornings and evenings. The actual periods surveyed were chosen randomly. All angler interviews and fish examinations were at the Dinosaur Lake boat launch (the only vehicle access to the lake). The interviewer recorded the following information:

- number of parties interviewed,
- number of anglers and effort,
- total number of rainbow trout (wild and hatchery) caught,
- number of wild rainbow trout harvested,
- number and type of hatchery rainbow trout harvested,
- number of all other species, (i.e., bull trout, mountain whitefish, lake whitefish and kokanee), caught and harvested.

When possible, angler origin and a qualitative assessment of fishing success and enjoyment were recorded. All fishing parties returning to the boat launch during a creel sampling period were interviewed. When anglers chose not to stop for an interview, records were kept to adjust the effort, catch and harvest estimates. A very small number of anglers accessed the lake via a crude trail on the west side of the reservoir. These anglers and their fish were not included in the results.

2.2 BIOLOGICAL DATA

Biological information was provided as raw data on computer disk by B.C. Environment from studies conducted from 1984 to 1888 (Appendix A). These data were summarized to generate condition factors, length-weight relationships and age-length plots. Prior to statistical analyses of length-weight and age-length relationships, data were log transformed to produce linearity.

2.3 CREEL SURVEY DATA

Creel information was supplied by B.C. Environment, in part, as summarized data from studies conducted during 1984 to 1988 (Appendix A). This information included estimates (+95 % confidence interval) of total angler number, total hours fished, total rainbow trout captured, and total number of wild and hatchery stock rainbow trout harvested. These numbers were based on an experimental design of stratified random sampling (i.e., weekend and weekday; AM period and PM period). The extrapolation procedure used to obtain total estimates followed Cochran (1977). Estimates of weekly angler effort and catch rates also were generated from tabulated data provided by the client following the same methods. Confidence intervals were placed on catch rates by use of propagation of error techniques which allow variance terms from different sample populations (i.e., fish captured and hours fished) to be combined. This technique was utilized to generate variance terms for two combined estimates: number of fish captured/hour angled (a quotient) and number of fish captured/day (a product). The second estimate was a product of number of fish captured/hour and mean number of hours fished in a day. The following equations were used to generate the combined variance terms:

$$\textit{Quotient SE} = \sqrt{\overline{X}^2 ab\left(\frac{SE_a^2}{\overline{X}_a^2} + \frac{SE_b^2}{\overline{X}_b^2}\right)}$$

$$\textit{Product SE} = \sqrt{\overline{X}_a^2 SE_b^2 + \overline{X}_b^2 SE_a^2}$$

Where: $\overline{X}_a$ = estimate of paramter a;
$\overline{X}_b$ = estimate of parameter b;
SE_a = standard error of parameter a
SE_b = standard error of parameter b

To obtain 95% confidence intervals, standard errors were doubled.

3.0 RESULTS

3.1 1988 CREEL SURVEY

3.1.1 Creel Data

In total, 506 fish were captured by anglers interviewed at Dinosaur Lake during the 1988 creel survey (1 July to 15 September). These included 482 rainbow trout and small numbers (< 15) of other sportfish. These were eight kokanee, one bull trout, fourteen mountain whitefish, one lake whitefish, and one Arctic grayling. Of the captured rainbow trout, 211 were harvested. Of these, 90 (48%) were wild rainbow trout and 98 (52%) were hatchery rainbow trout.

An estimated 1599±322 anglers fished 3496±715 hours during the creel survey which extended from 1 July 1988 to 15 September 1988. These anglers captured an estimated 997±231 rainbow trout during this period, and harvested 205±59 wild rainbow trout and 216±68 hatchery rainbow trout.

Angler success was low, the average catch rate being 0.62±0.20 rainbow trout/angler day or 0.29±0.07 rainbow trout/hour. The estimated number of hours in an angler day was 2.2±0.23 h. The number of anglers using Dinosaur Lake varied during the creel survey period (Figure 2). High numbers were associated with long weekends which occurred during 2 July and 10 September periods. A peak during the 27 August period was caused by a large group of anglers (26 juveniles) counted on 25 August.

A high percentage of anglers utilizing Dinosaur Lake during the creel survey originated from the immediate area (Table 1). This pattern was consistent during all three months of the survey. Over 57% of the anglers interviewed were Peace River area residents and 26% were local juveniles. Angler opinions of fishing success and satisfaction also exhibited distinct patterns (Table 2). Over 73% of those questioned rated their success as poor, although 95% enjoyed their overall angling experience.

3.1.2 Biological Data

Biological data were collected from 220 sportfish (211 rainbow trout, 5 kokanee, 2 mountain whitefish, 1 Arctic grayling and 1 lake whitefish), but data analyses were conducted only for rainbow trout due to insufficient sample sizes for other species.

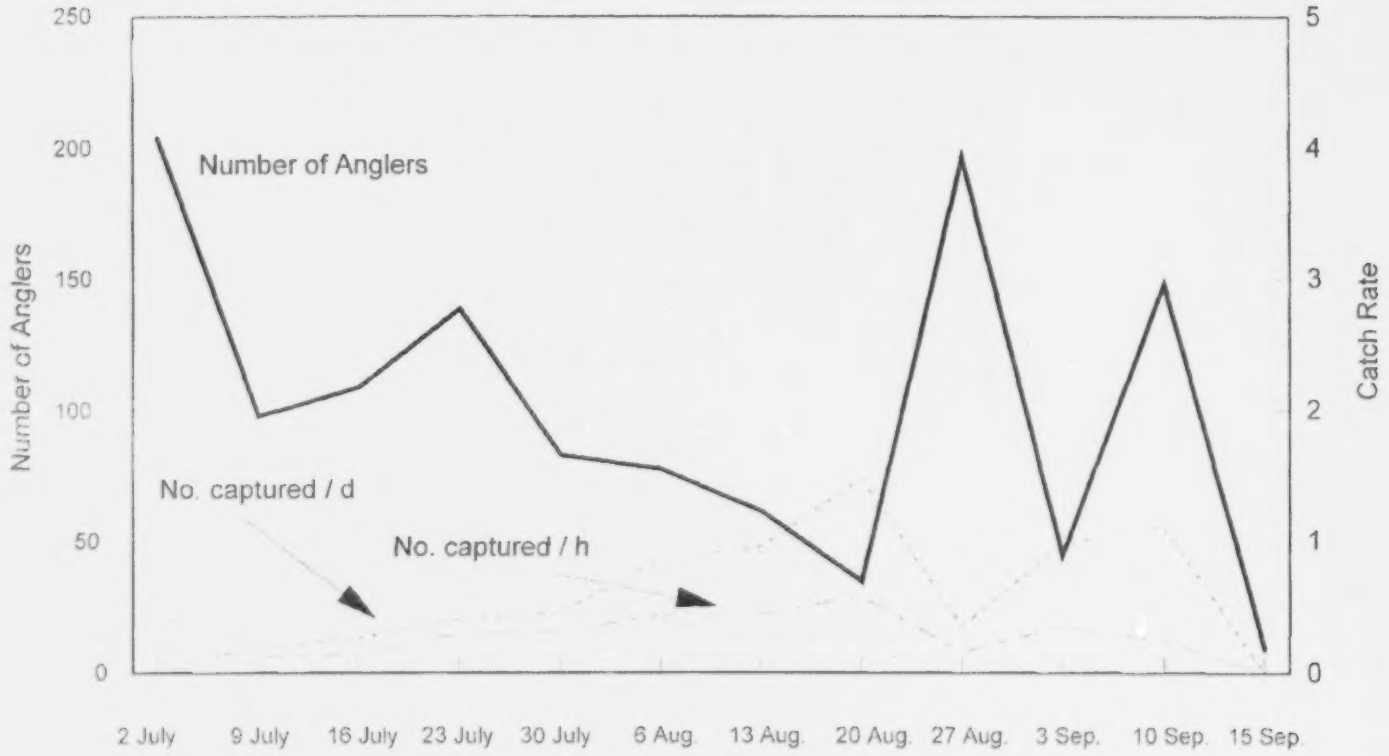

Figure 2. Weekly estimates of angler number and catch rates of rainbow trout during the Dinosaur Lake creel suvey, 1988.

Table 1 Origin of anglers interviewed during Dinosaur Lake creel survey, 1988.

Month	Angler Origin (percentage in brackets)								Total
	1	2	3	4	5	6	7	8	
July	219 (55.9)	19 (4.8)	41 (10.5)	-	14 (3.6)	91 (23.2)	2 (0.5)	6(1.5)	392
August	141 (55.3)	9 (3.5)	21 (8.2)	1 (0.4)	3 (1.2)	69(27.1)	5 (2.0)	6 (2.4)	255
September	49 (63.6)	2 (2.6)	2(2.6)	-	2 (2.6)	18 (23.4)	-	4 (5.2)	77
TOTAL	190 (57.2)	11(3.3)	23 (6.9)	1 (0.3)	5(1.5)	87 (26.2)	5 (1.5)	10 (3.0)	332

1 Peace River area residents
2 Other B.C. residents
3 Alberta residents
4 Other Canadians
5 Non-residents
6 Local juveniles
7 B.C. resident juveniles
8 Other juveniles

Table 2 Summary of angler opinion concerning success and enjoyment of angling trip during Dinosaur Lake creel survey, 1988.

Month	No. Groups	Success Rating Percentage				Enjoyment Percentage		
		Poor	Fair	Good	Excellent	Yes	No	Indifferent
July	175	73.1	16.0	9.1	1.7	94.3	0.6	5.1
August	103	72.8	14.6	11.7	1.0	97.1	-	2.9
September	35	77.1	14.3	8.6	-	94.3	-	5.7
TOTAL	313	73.5	15.3	9.9	1.3	95.2	1.0	4.5

The length-weight relationships for wild and hatchery stock rainbow trout were similar (Figure 3). The length-weight relationships for these two stocks are expressed by the following equations:

Wild $W = (5.623 \times 10^{-5}) L^{2.709}$

Hatchery $W = (3.304 \times 10^{-5}) L^{2.803}$

Mean condition factors of wild and hatchery stock were similar at all age-classes (Table 3), although individual values ranged from 0.74 to 1.49. All captured fish were healthy and did not exhibit heavy parasite loads.

Age distributions of wild and hatchery stock rainbow trout also were similar (Figure 4). Fish from both stocks entered the sport fishery at age-2, and the majority of fish harvested were between 2 and 4 years of age. A slightly higher number of age-2 hatchery fish were captured versus wild fish (26 versus 19); however, this difference was not statistically significant (G-test, $P>0.05$). Age-length relationships for wild and hatchery

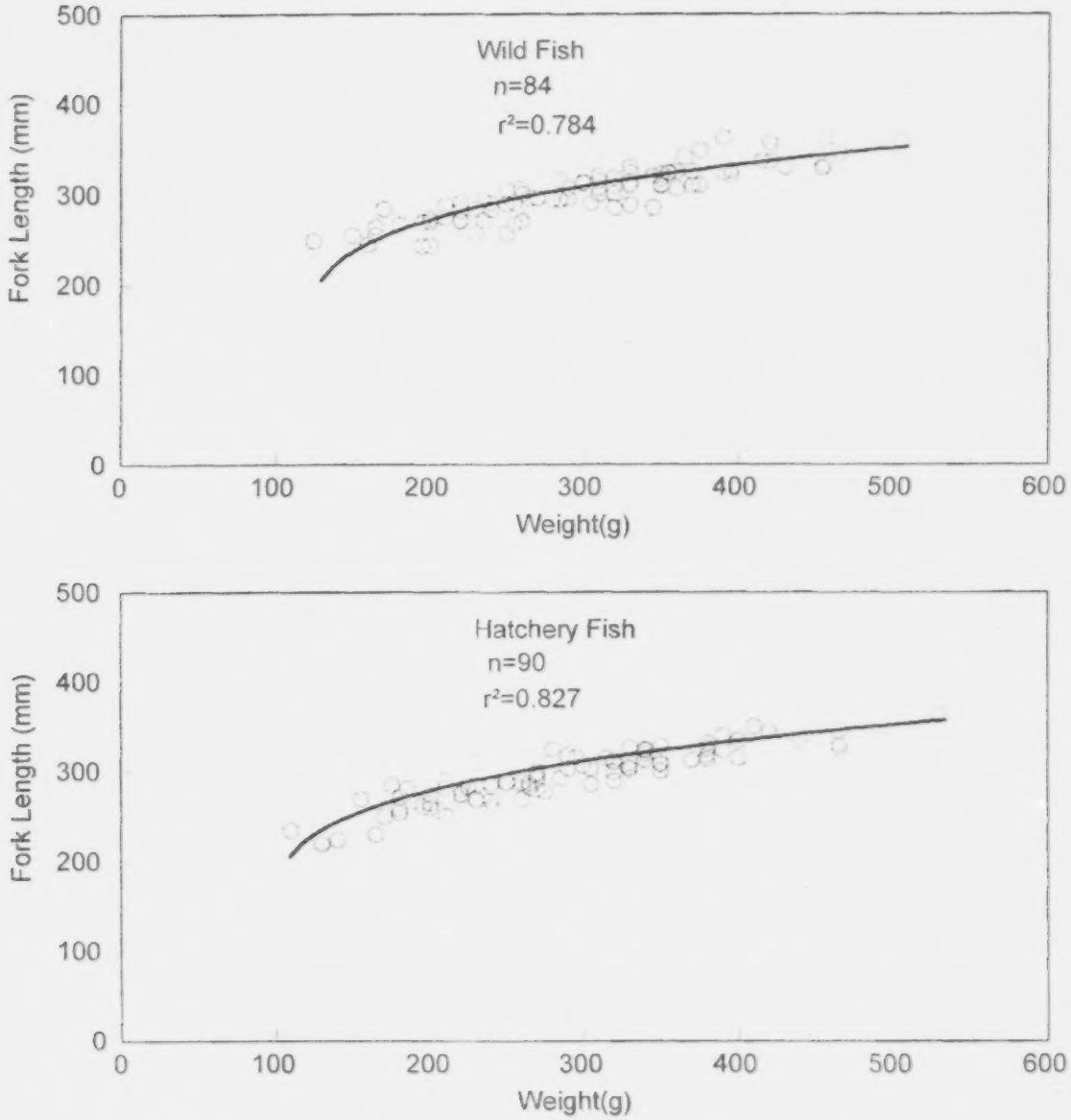

Figure 3. Length - weight relationship for wild and hatchery stock rainbow trout harvested during Dinosaur Lake creel survey, 1988.

Figure 4. Age distribution of rainbow trout harvested during Dinosaur Lake creel survey, 1988.

rainbow trout suggest that differences exist in growth rates (Figure 5) with wild rainbow trout achieving larger sizes in older age-classes. Mean fork lengths of wild 2, 3, 4, and 5 year old fish were 271 mm, 300 mm, 323 mm, and 339 mm, whereas mean fork lengths for hatchery fish were 273 mm, 294 mm, 315 mm and 316 mm, respectively. Although wild fish were consistently larger than hatchery fish for all age-classes greater than age-2, there were no statistically significant differences within each age-group (Table 4). If a comparison is made of age-length slopes of the two stocks for fish aged 2 to 5, a statistical difference is apparent (Figure 6). Wild fish grew faster than hatchery fish ($P<0.001$). Mean lengths were utilized for the statistical comparison of slopes to remove biases associated with unequally weighted sample sizes for each age-class.

Table 3 Condition factors[a] for rainbow trout harvested during Dinosaur Lake creel survey, 1988.

Stock	Age	n	Mean	Minimum	Maximum
Wild	2	19	1.10	0.81	1.38
	3	45	1.09	0.82	1.49
	4	21	1.04	0.74	1.27
	5	2	1.01	0.91	1.11
	6	-			
Hatchery	2	26	1.10	0.83	1.36
	3	43	1.10	0.77	1.37
	4	17	1.05	0.76	1.25
	5	4	0.99	0.82	1.17
	6	3	1.10	1.07	1.13

[a] Condition factor - calculated as weight (g) x 10^5 divided by fork length (mm) cubed.

Table 4 Summary of statistical comparisons (t-test, pooled variance) of growth of wild and hatchery stock rainbow trout harvested during Dinosaur Lake creel survey, 1988.

Age	Stock	n	Mean Length (mm)	SD	SE	t Value	df	2 Tailed Probability
2	Wild	19	270.7	23.46	5.38	-0.27	43	0.791
	Hatchery	26	272.5	20.76	4.07			
3	Wild	45	299.9	22.28	3.32	1.14	86	0.256
	Hatchery	43	294.1	24.83	3.79			
4	Wild	21	322.6	20.78	4.53	1.18	36	0.244
	Hatchery	17	314.5	21.21	5.14			
5	Wild	2	339.0	4.24		*		
	Hatchery	4	316.0	31.32	15.66			
6	Wild							
	Hatchery	3	315.7	26.95	15.56			

* Sample size too small for valid statistical comparison.

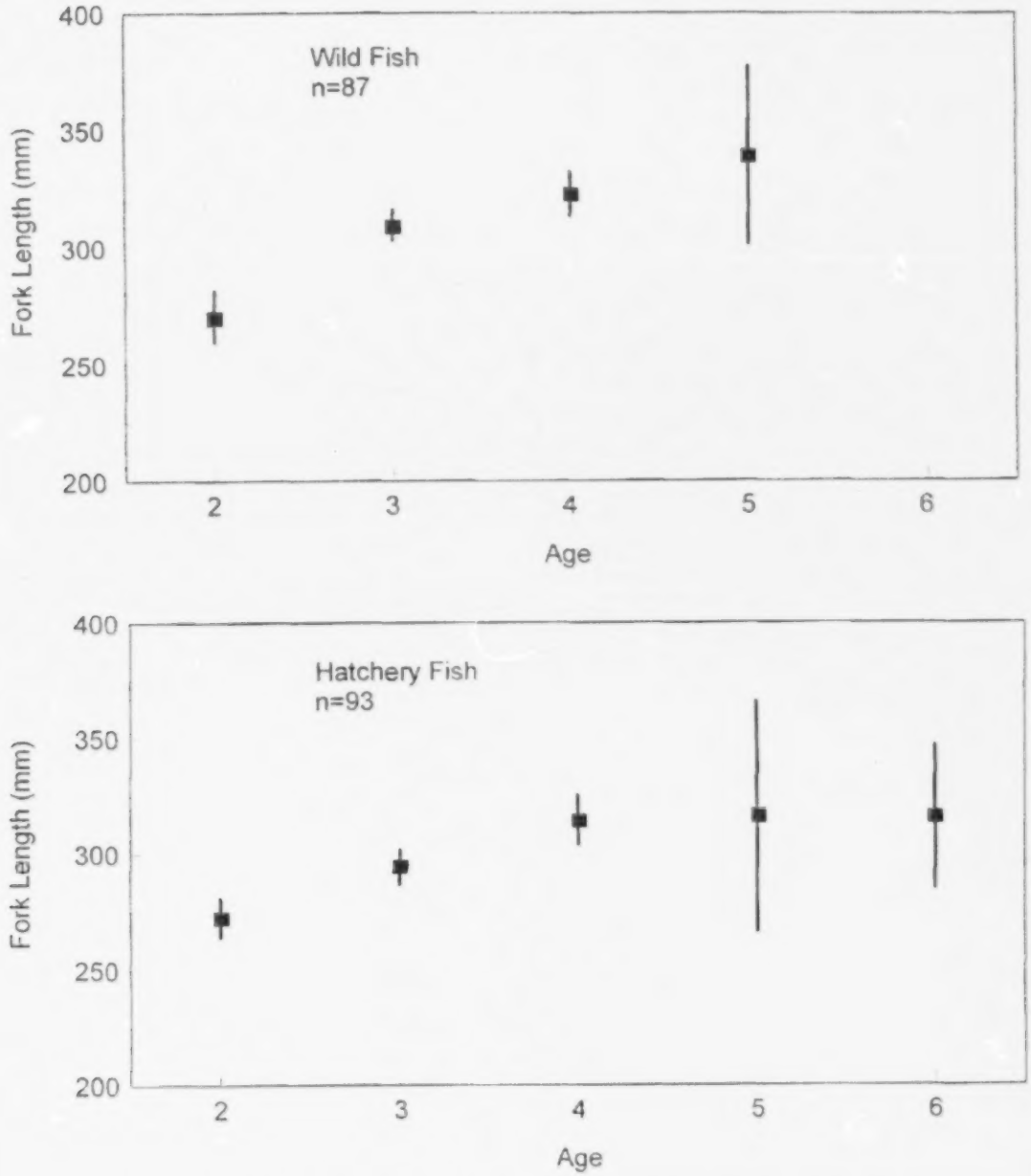

Figure 5. Age - length plot (mean ± 95% C.I.) for wild and hatchery stock rainbow trout harvested during Dinosaur Lake creel survey, 1988.

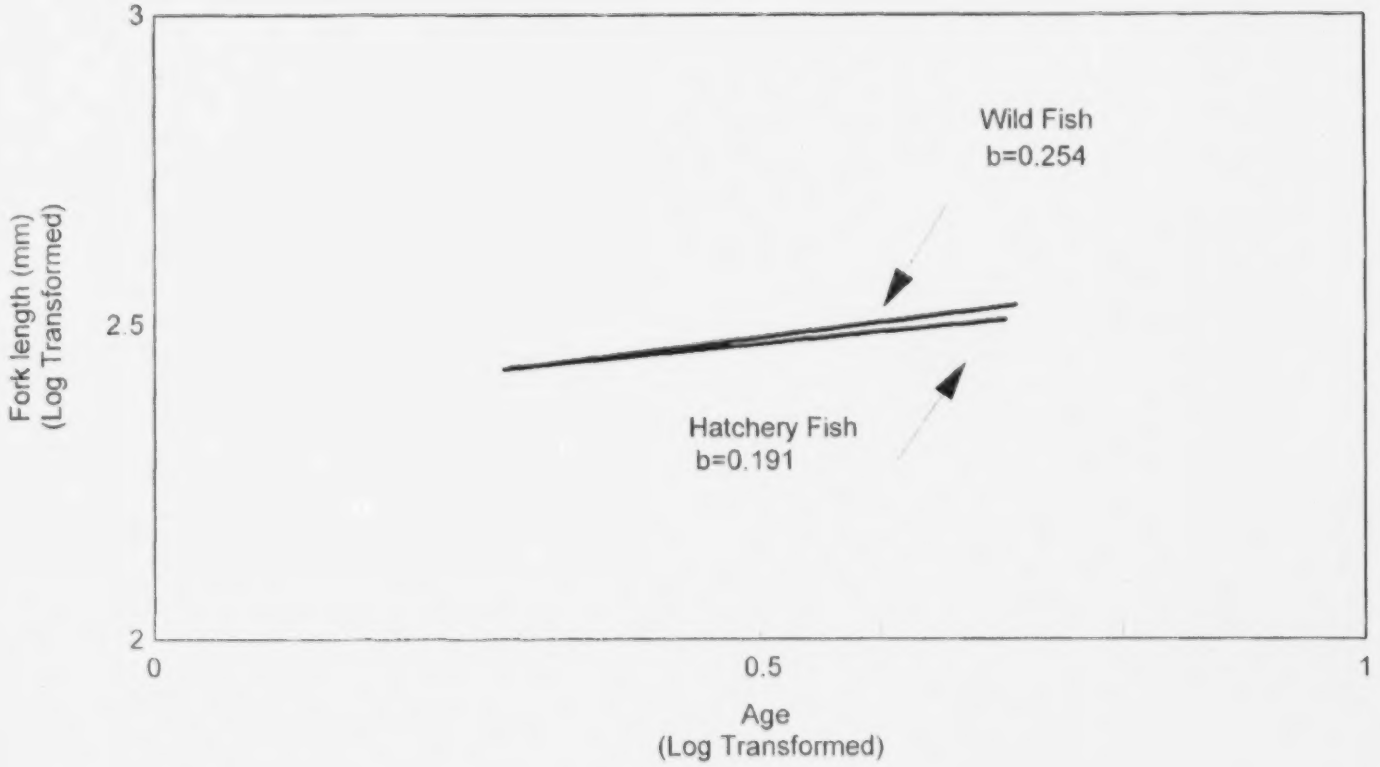

Figure 6. Regression lines for age versus mean length (log transformed data of ages 2,3,4, and 5) for wild and hatchery stock rainbow trout harvested during Dinosaur Lake creel survey, 1988. Slopes are statistically different at $P<0.001$.

3.2 REVIEW OF CREEL SURVEYS (1984 - 1988)

3.2.1 Survey Methods

Creel survey methods during all years utilized a similar stratified sampling design (see Section 2.1). All angler interviews and fish examinations concerning the Dinosaur Lake sport fishery took place at the Dinosaur Lake boat launch (the only vehicle access to the lake); therefore, most anglers utilizing the lake were available for census. The creel surveys took place between 1 July and mid-September during all years except 1985 when a potential slide forced closure of Dinosaur Lake until 3 August. During that year, the survey commenced on 3 August and extended to 3 October.

Estimates generated from 1986 to 1988 data were provided with 95% confidence intervals.

3.2.2 Recapture of Tagged Fish

During 1983 and 1984 and again in 1986, biophysical inventories of Dinosaur Lake and its tributaries were conducted by B.C. Environment personnel. During these programs, rainbow trout were tagged in an attempt to generate population estimates. During 1984, 116 of the 2099 fish examined during the creel survey were recaptures. The size of the catchable trout population (fish aged 2 and older) in the reservoir was estimated at 16 854 fish. This estimate should be viewed with caution. Entrainment of tagged fish through Peace Canyon Dam, growth of fish into the catchable population, mortality of tagged fish and tag loss are factors which can bias the estimate upwards. Return rates of tagged fish during the remaining years were low (i.e., 2 in 1985, 42 in 1986, 1 in 1987, and O in 1988) which precluded calculation of reliable population estimates.

3.2.3 Size and Age Distribution

Age distributions of rainbow trout harvested from 1984 to 1988 ranged between ages 1 and 6. The major component of the catch consisted of fish aged 2, 3 and 4 (Figures 7 and 8). The size of harvested fish reflected this age distribution. Maximum sizes rarely exceeded the 360 mm size-class for either wild or hatchery stock fish.

Size and age distributions of hatchery and wild stock rainbow trout in Dinosaur Lake did not remain constant between 1984 and 1988. Year-class strength was a primary influence affecting distribution patterns. For example, the strong cohort of age-2 wild trout recorded in 1987, predominated the harvest of wild stock the following year as age-3 fish. This pattern also was observed during 1984 and 1985. Year-class strength of

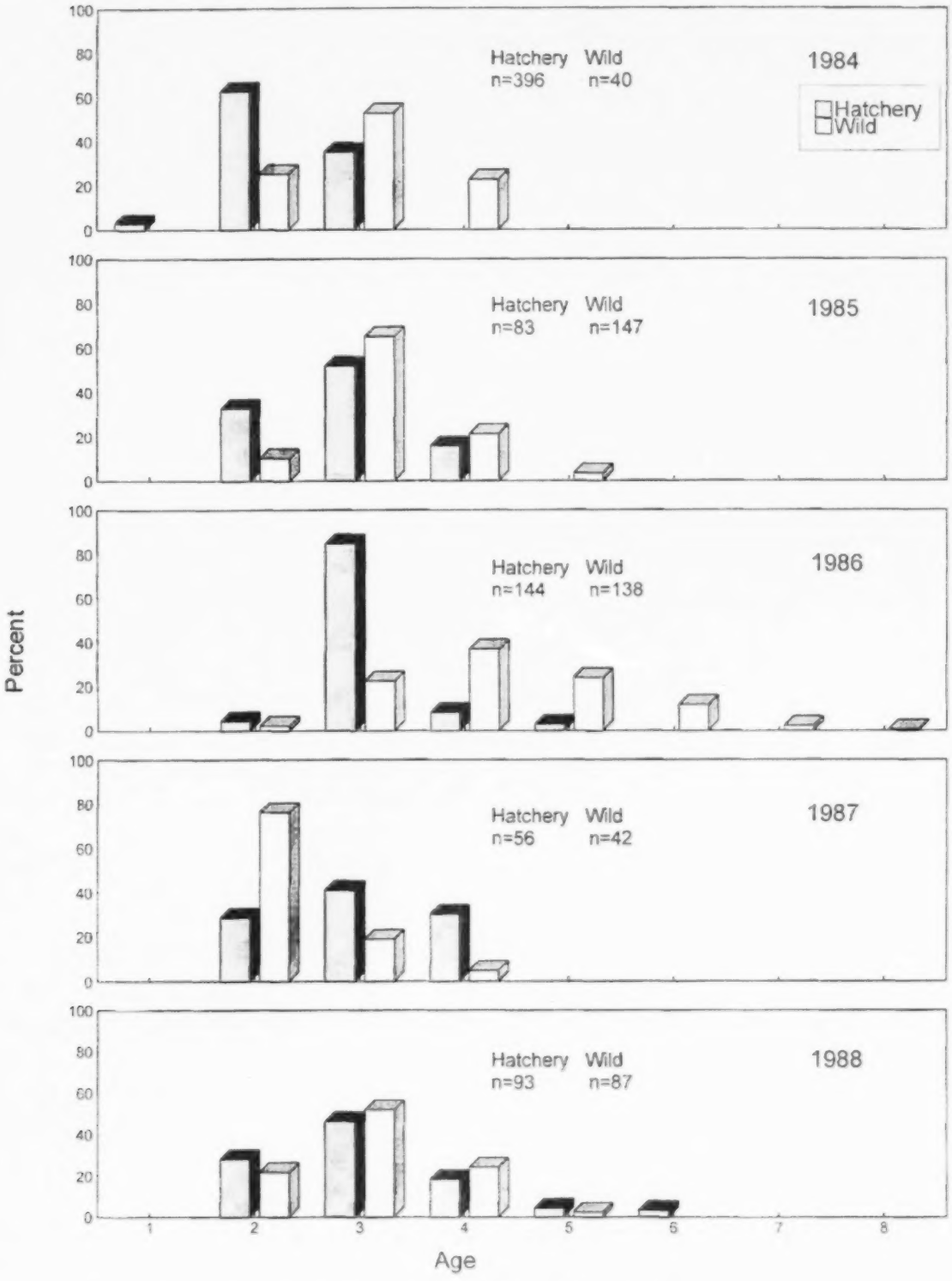

Figure 7. Age distribution of wild and hatchery stock rainbow trout harvested from Dinosaur Lake during summer creel surveys, 1984-1988.

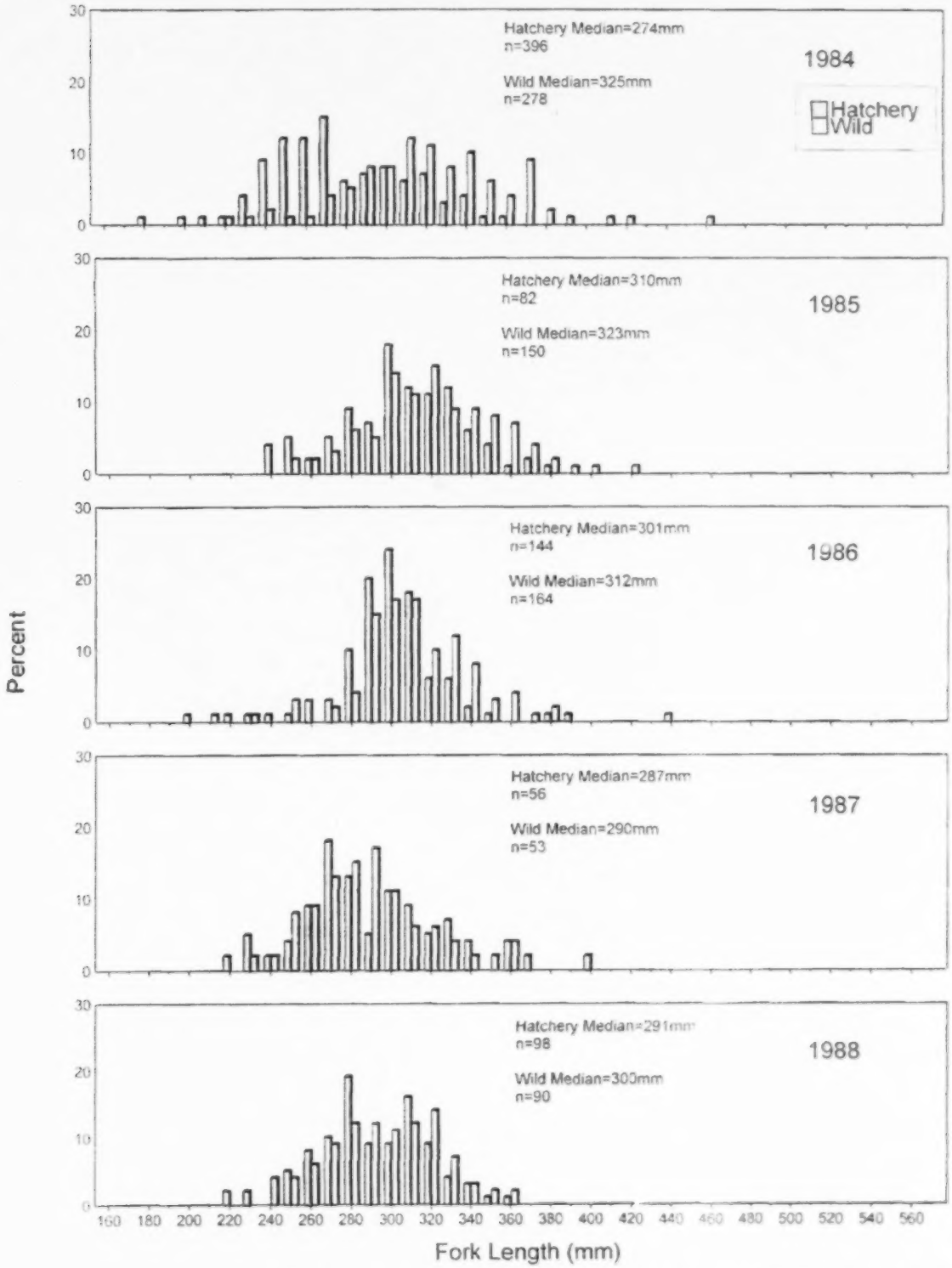

Figure 8. Length frequency distribution of wild and hatchery stock rainbow trout harvested from Dinosaur Lake during summer creel surveys, 1984-1988.

hatchery fish was controlled by the number of fish stocked. Stocking rates shown in Table 5 can explain some of the observed patterns. The large number of fingerlings stocked in 1984 (62 920 fish) could account for the high percentage of age-3 hatchery fish taken during 1986.

Table 5 Stocking rates of hatchery rainbow trout in Dinosaur Lake between 1982 and 1988.

Year	Number Stocked		
	Fingerlings	Fry	Combined
1982	14 091		14 091
1983	19411	24293	43 704
1984	62 920	27 832	90 752
1985	33 476		33 476
1986	65 841		65 841
1987	46 455		46 455
1988	73 373		73 373

A second factor controlling size distribution was the minimum size restriction. A no size limit regulation during 1984 was replaced by a 300 mm minimum size limit in 1985 and 1986. It was then lowered to 250 mm during 1987 and 1988. The influence of these regulations are illustrated by size distributions in a given year; they result in shifts in minimum size towards smaller or larger fish depending on the size limit (Figure 8).

3.2.4 Composition of the Catch

During all years, rainbow trout was the predominant species captured by anglers utilizing Dinosaur Lake (>95%). Kokanee, bull trout, lake whitefish, mountain whitefish and Arctic grayling also were captured by anglers, but numbers taken were very low.

The composition of rainbow trout (i.e., stocked versus wild fish) changed during some years (Table 6). The ratio for harvested fish was skewed towards hatchery stock during 1984 (59% versus 41%), while the opposite occurred during 1985 (36% versus 64%). Ratios for both years differed significantly from a random distribution (G-test, $P < 0.001$). This reversal in ratios probably occurred in response to availability of hatchery fish to anglers. Because initial stocking of the reservoir took place in 1982 (B.C. Environment Stocking Records), a large number of smaller size-classes became available to anglers in 1984. The absence of a size limit during this year allowed the harvest of this group, thereby skewing the catch towards hatchery fish. In 1985, a 300 mm minimum size restriction was placed on the fishery which made a large portion of smaller sized hatchery fish unavailable for harvest, thereby skewing the distribution towards wild fish. For the remaining

three years of the creel survey, the ratio of hatchery rainbow trout to wild rainbow trout approximated a 1:1 distribution.

Table 6 Summary of effort, and rainbow trout catch and harvest on Dinosaur Lake from 1984 to 1988.

Year	Effort (Anglers) ±95%CI	Effort (Hours) ±95%CI	Catch ±95%CI	Harvest ±95%CI	Proportion Harvested	Catch Rate (Fish/h) ±95%CI	Composition (%)	
							Wild	Hatchery
1984	4702	13470	3965	3965	1.00	0.29	41.2	58.8
1985	1237	3940	1195	627	0.52	0.30	64.4	35.6
1986	2044±303	6397±1144	2380±458	799±431	0.33	0.37±0.076	53.2	46.8
1987	1240±119	2932±529	597±164	274±92	0.45	0.20±0.057	48.6	51.4
1988	1599±322	3496±715	997±231	421±90	0.42	0.29±0.069	47.9	52.1

3.2.5 Angling Effort and Catch Rates

Estimated angler effort expended on Dinosaur Lake, in terms of total number of anglers and number of hours fished, was not constant between 1984 and 1988 (Table 6). The greatest amount of effort occurred during the first year Dinosaur Lake was opened to recreational fishing, when 4 702 anglers spent 13 470 hours fishing during the survey period (1 July to 22 September). Effort then decreased by approximately 75% and remained relatively constant for the remaining surveys. Total effort during 1985 was reduced by closure of Dinosaur Lake to angling until 3 August, due to a potential landslide hazard. Also, total effort during 1986 was slightly less than 50% of that for 1984. The estimated total number of rainbow trout captured was proportional to the effort expended by anglers, that is greater effort returned greater numbers of fish. The number of rainbow trout captured ranged from a high of 3965 during the 1984 survey period, to a low of 597 during the survey in 1987. The proportion of captured fish which were harvested by anglers was initially very high (i.e., no size restrictions, so most kept), but decreased when size restrictions were established.

Although effort and catch varied between years, estimated catch rates remained relatively constant (Figure 9). The number of fish captured per angler hour was low, ranging between 0.37 during the 1986 creel survey and 0.20 during 1987. Based on 95% confidence intervals, only two estimates differed statistically (i.e., in 1986 and 1987). The catch rate observed during 1984 was essentially the same as the 1988 estimate.

3.2.6 Angler Origin and Opinion of Fishing Experience

Angler origin remained constant during all years of the creel survey (Figure 10). Over 75% of all anglers interviewed were from the Peace River region. During the first year in which angling was permitted on the reservoir, non-local B.C. residents made up the second most abundant group (14%). During the remaining years, however, Alberta residents became second in abundance after local residents. Other Canadians and non-residents consistently made up less than 5% of recreational anglers on Dinosaur Lake.

Most anglers (> 50 %) rated their fishing success as poor during all years (Figure 11); very few anglers felt their angling experience was excellent. Conversely, of anglers who expressed an opinion, most enjoyed their overall fishing experience. This pattern was consistent for all creel survey periods.

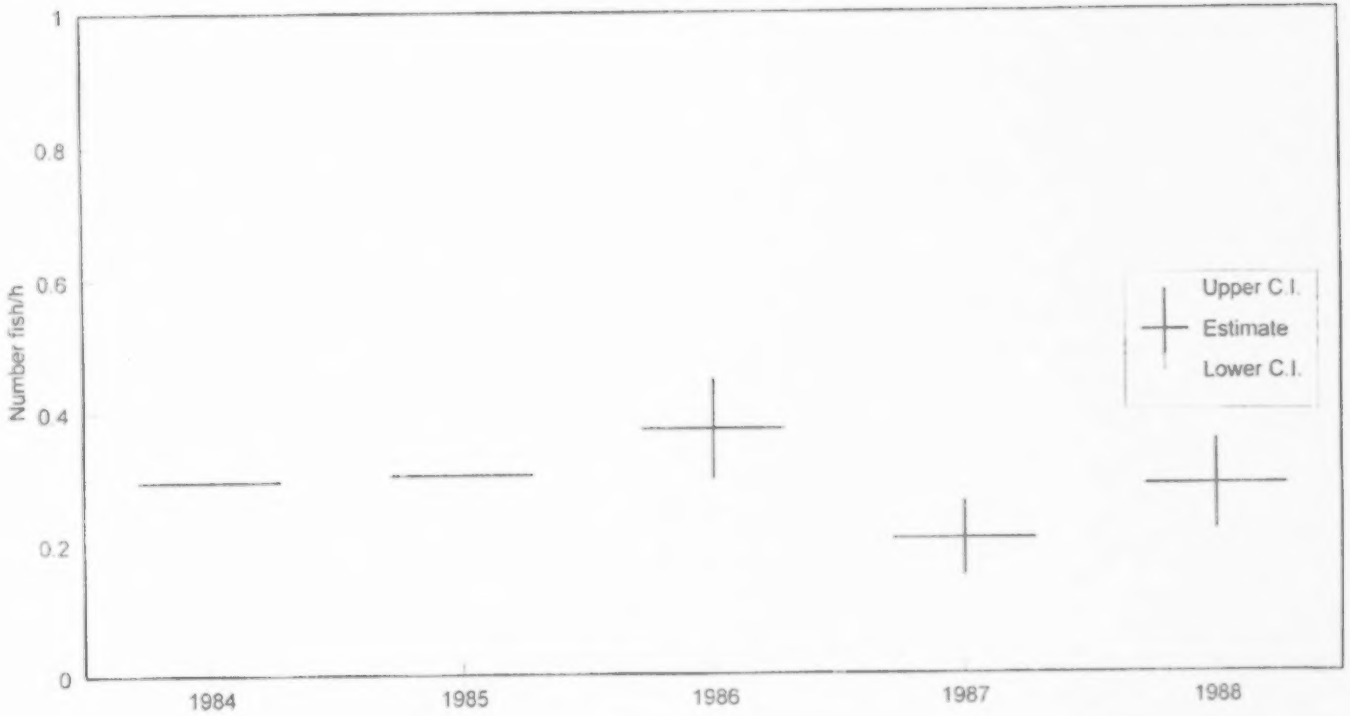

Figure 9. Estimates (±95% C.I.) of catch rates for rainbow trout from Dinosaur Lake during summer creel surveys conducted from 1984 to 1988.

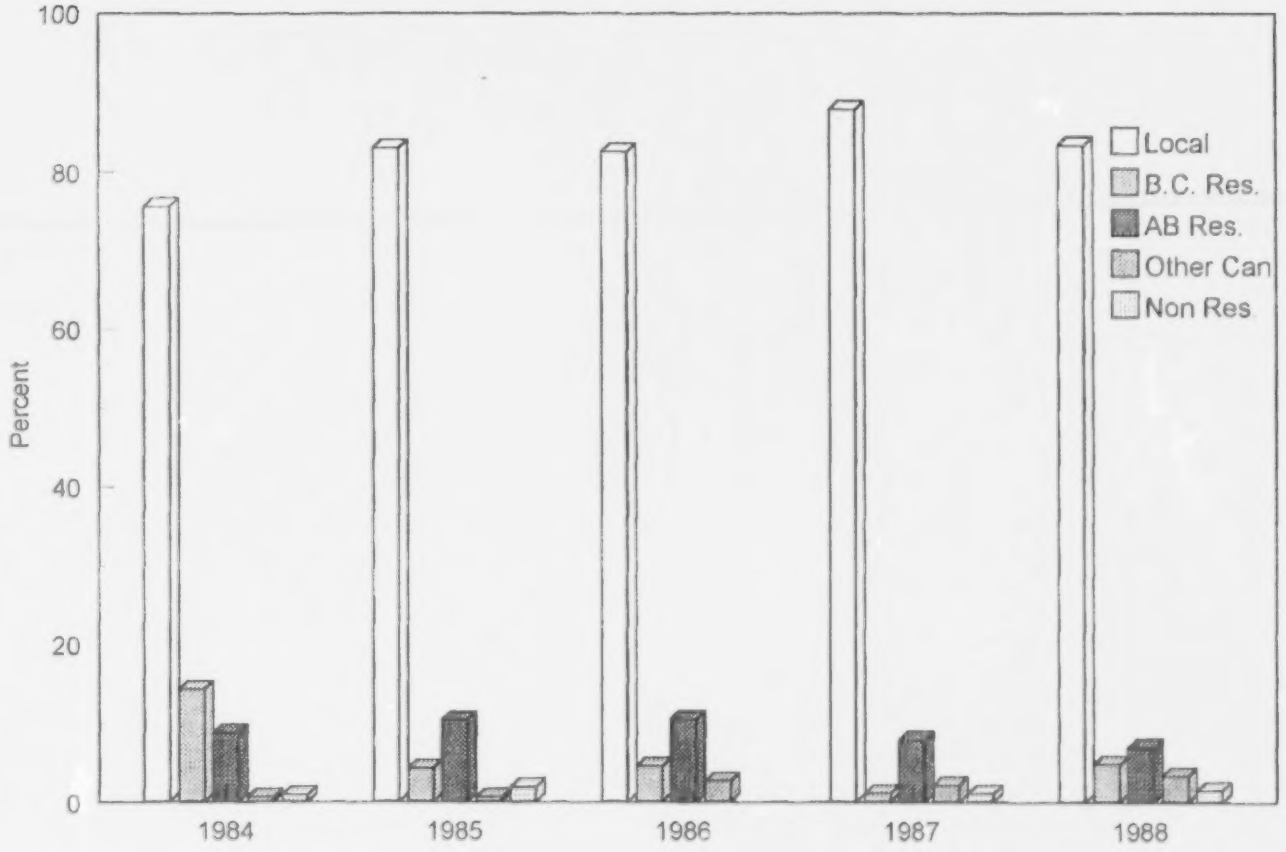

Figure 10. Origin of anglers utilizing Dinosaur Lake during summer creel surveys conducted from 1984 to 1988.

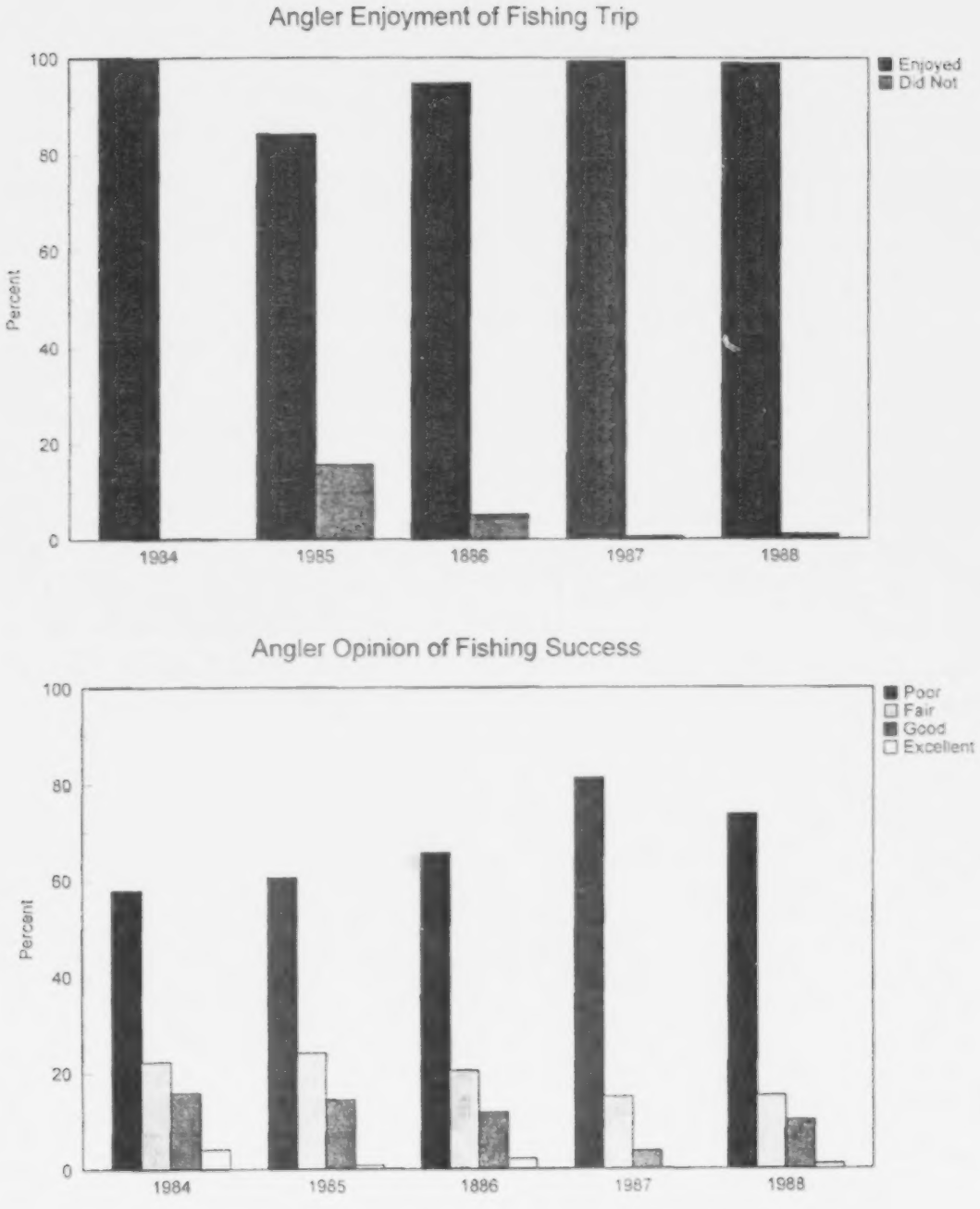

Figure 11. Rating of fishing success and overall enjoyment of their fishing trip by anglers interviewed during summer creel surveys conducted on Dinosaur Lake, 1984 to 1988.

4.0 DISCUSSION

Rainbow trout was the predominant species captured by anglers utilizing Dinosaur Lake from 1984 to 1988 (i.e., >95%). Other species captured included kokanee, bull trout, Arctic grayling, mountain whitefish and lake whitefish; however, numbers of these species were very low. Kokanee are a species whose population size may increase in future years. These fish presumably originated in Williston Lake, and were entrained into Dinosaur Lake through the generators or spillway at the W.A.C. Bennett Dam. This species is continuing to extend its range downstream having been encountered in the Peace River below the Peace Canyon Dam (Pattenden et al. 1990), as well as in Alberta (Hildebrand 1990). Because there is little spawning habitat available in Dinosaur Lake, kokanee numbers will be dependent on entrainment from Williston Lake.

The rainbow trout population in Dinosaur Lake was composed of hatchery and wild stock. The relative contribution of these two groups to the catch varied but remained at approximately 1:1 during most years. Both stocks were available to the sport fishery by age-2 and predominant age-classes of harvested fish were ages 2, 3, and 4. Size distributions of stocks during each year were dependent on age-class strength and the angling regulations for minimum size. Both stocks exhibited similar size distribution patterns. Most harvested rainbow trout were between 240 mm and 360 mm fork length. The above information suggests that hatchery stock rainbow trout made a significant contribution to the Dinosaur Lake sport fishery relative to the wild fish contribution during each year of the survey. However, the overall return of stocked fish to the creel was low.

Both stocks exhibited good growth rates which was an indication that food sources were not limiting, and competition between the stocks was probably negligible. Rainbow trout in Dinosaur Lake exhibited better growth rates than other northern populations (e.g., Carp Lake near Prince George). Growth rates of Dinosaur Lake fish were similar to rates described for the Peace River rainbow trout population which is located just downstream (Hammond 1987; Pattenden et al. 1990).

Dinosaur Lake was first opened to angling in 1984 and the sport fishery was very popular during this first summer (4702 anglers). Surveys completed during subsequent years documented much lower angler use, with angler effort ranging from 1237 anglers in 1985 to 2044 anglers in 1986. The low numbers observed during 1985 were in part due to closure of Dinosaur Lake to anglers until 3 August of that year. The drop in effort between 1984 and all other years probably reflects a reduction in angler interest in this fishery. Another factor which could influence the number of anglers is weather during a particular year. Poor conditions on a single long-weekend can reduce the total numbers of anglers estimated during a short duration creel survey such as the one conducted on Dinosaur Lake. Although weather conditions may cause yearly variation in estimates of angler effort, weather does not account for the distinct pattern observed from 1984 to 1988.

The Dinosaur Lake sport fishery is small compared to other recreational fisheries in the immediate vicinity. For example, immediately downstream of Dinosaur Lake, an estimated 7 221 anglers fished the Peace River during summer 1985. An estimated 5 680 anglers utlized the same area during 1989 (DPA Group 1990). The popular walleye fishery on Charlie Lake, which is located near Fort St. John, is utilized by approximately 13 000 anglers each summer (Ted Down, B.C. Environment, pers. comm.).

Most anglers utilizing Dinosaur Lake between 1984 and 1988 were individuals residing in the immediate area which suggests that the sport fishery does not attract a significant component of tourists from outside the Peace River region.

Total rainbow trout catch was closely related to total effort. An initial catch of 3965 rainbow trout during 1984 fell to 1195 during 1985. It remained low during subsequent years ranging between 597 fish in 1987 and 2380 fish during 1986. These estimates, although related to effort, also were influenced by other factors. Variability in total catch may have been in response to changes in catchability of rainbow trout. For example, during 1986, B.C. Hydro reduced its discharge rates from the Peace Canyon Dam between 15 July and 15 August, which may have changed the vulnerability of fish to angling. The catch between 15 July and 15 August increased dramatically while the effort expended by anglers dropped (Figure 12). During the week of 30 July, the catch peaked at 1250 fish for 240 hours fished which represented a catch rate greater than 5.0 fish/h. Causal factors for this increase are unknown, but this phenomenon may explain the occurrence of an unusually large catch of rainbow trout during 1986.

Estimated catch rates remained relatively constant for each year surveyed, ranging between 0.37 fish/h in 1986 to 0.20 fish/h in 1987. These rates were low but were similar to estimated catch rates for other rainbow trout sport fisheries in British Columbia. Work done by ARA Consulting Group (1992) on the lower Columbia River and Brilliant Reservoir showed angler success rates of 0.14 fish/h and 0.22 fish/h, respectively. Catch rates of anglers utilizing the Peace River during 1989 just downstream of Dinosaur Lake also were low (0.13 fish/h) (DPA Group 1990). These estimates were based on an entire year of data compared to the summer creel survey on Dinosaur Lake. Work done by Hammond (1986) during 1985 on the Peace River in the same study area as DPA Group estimated the angler catch rate to be 0.24 fish/h (this value does not include a catch rate of 0.69 fish/h achieved by anglers using the Peace Canyon Tailrace, an area which is now closed to angling). On another reservoir, Lake Revelstoke, anglers experienced catch rates of 0.21 fish/h during the summer of 1992 (R.L. & L. 1993a). This information suggests that the Dinosaur Lake sport fishery, although producing low catch rates, is comparable to some other rainbow trout sport fisheries in the province.

Most anglers rated their fishing success in Dinosaur Lake as poor. Despite this low opinion of their success, most enjoyed their overall angling experience. Satisfaction of a fishing trip coupled with low angling success has been observed in a poor quality sport fishery in Alberta (R.L. & L. 1993b). This pattern was most

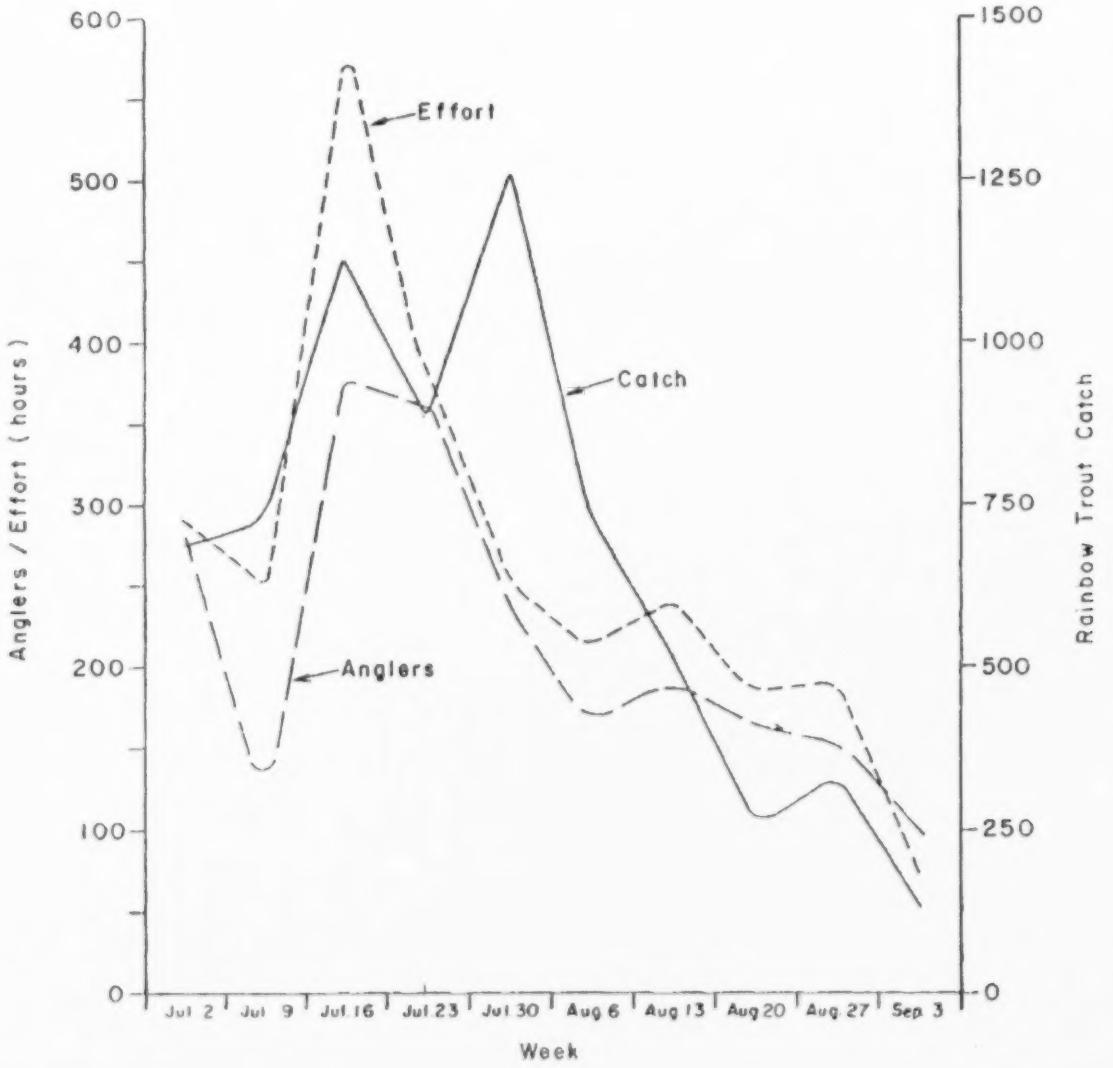

Figure 12 Angler effort and rainbow trout catch over time during Dinosaur Lake creel survey, 1986

Source: Hammond, 1987

likely a result of factors other than catch rates which influence the individual's angling experience. Aesthetics (i.e., scenery and weather) can be important to angler's enjoyment of a trip (Moeller and Engelkin 1972). Anglers utilizing Dinosaur Lake may place an equal or higher value on these aesthetic factors rather than on size or number of fish captured.

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